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ABSTRACT

A sample of 467 college freshmen attending a comprehensive, medium size, public institution on the mid-Atlantic coast was studied to examine the relationship between the development of identity and the development of cognition in traditional college freshmen. The sample was predominantly white (88.3%) and of the total number, 51 percent were male and 49 percent female. The Erwin Identity Scale (EIS) and the Scale of Intellectual Development were used in the assessment. The results of the investigation suggest that identity and cognitive development are related and that this relationship is a negative one. It was found that the higher a student's level of cognitive development the lower his or her development of identity; conversely, the lower a student's level of cognitive development, the higher his or her development of identity. Contains 26 references. (GLR)

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The Relationship Between Identity and Cognitive Development in College Freshmen: A Structural Equation Modeling Analysis

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Running head: IDENTITY AND COGNITION

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Jean Endo
Chair and Editor
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Abstract

The relationship between cognitive development and the development of identity in college freshmen was examined. Results suggested that during the beginning of the freshman year of college, students higher in cognitive development tend to have a less developed sense of self than students with lower levels of cognitive development.

The Relationship Between Identity and Cognitive Development in College Freshmen

The Eriksonian (e.g., 1959, 1963, 1968) psychosocial concept of identity has received a great deal of attention over the past several decades. Erikson placed identity or self image within his theory of psychosocial development, viewing the formation of identity as distinctive, but not exclusive, to adolescence (Marcia, 1980). Erikson (1959) proposed an eight stage theory of psychosocial development that persons progress through from infancy to old age. He focused a great deal of attention on the fourth stage, identity formation versus identity diffusion, the stage that most college undergraduates are struggling with (Marcia, 1980).

As Erikson (1959) states:

> The sense of ego identity, then, is the accrued confidence that one's ability to maintain inner sameness and continuity is matched by the sameness and continuity of one's meaning for others. Thus, self-esteem...grows to be a conviction that one is learning effective steps toward a tangible future, that one is developing a defined personality within a social reality which one understands (p. 89).

Much of the earlier work on identity (e.g., Chickering, 1969; Marcia, 1966) focused on interpretation of Erikson's definition of identity and establishing validity for the construct itself. Two more recent research areas focusing on identity have included (a) examining the relationship between identity and a number of noncognitive measures, and (b) examining identity over the life span.

A number of noncognitive measures appear to be positively correlated with identity. For example, the development of moral reasoning seems to accompany the development of identity. Some studies have found that individuals high in identity tend to have higher levels of moral development, whereas those with lower levels of identity tend to have lower levels of moral development (see, e.g., Podd, 1972; Poppen, 1974). Similarly, Hayes (1977), using measures of moral attitudes developed by Hogan (1973), found that individuals with high levels of identity tend to be more ethical, more empathetic, and more socialized than individuals with low levels of identity. On the other hand, some noncognitive measures

appear to be negatively related with identity. Stark and Traxler (1974) found that subjects with higher levels of identity tended to be more anxious than those with lower levels.

Most of the work examining the development of identity over the life span has concentrated on the adolescent and adult years. All other things being equal, persons formulate a better sense of self as they grow older. A number of studies have focused specifically on the development of identity during college. In general, the college environment fosters students' development of identity (e.g., Chang, 1982), particularly during the upper class years. The college environment also appears to promote the development of identity in males to a greater extent than females. Participation in student organizations and/or working during college also tends to facilitate students' development of identity during the college years (Chang, 1982).

Although a good deal of research has been conducted with college age populations, research examining the relationship between intellectual development and identity has been limited. Some work has been conducted relating achievement and academic status with identity; however, the results have been mixed. For example, Berzonsky (1985) found that freshmen low in identity tended to be academic overachievers. On the other hand, Chang (1982) found that college students with higher academic status tended to have higher levels of identity.

The lack of research on the relationship between identity and cognitive development may be attributed to researchers overlooking the personal development of students high in cognitive development. It is often assumed that those with high levels of cognitive development generally have a good sense of self or a high self concept.

For purposes of this study, cognitive development will be defined and measured by the Perry (e.g., 1970) model of cognitive development. Elaborating on the Piagetian model of cognitive development which extends from birth to adulthood, Perry (1970) proposed a scheme of intellectual development for the college years. Perry proposed nine different stages of intellectual development and placed these stages in four general categories. In short, Perry's model of cognitive development proposes that persons move from a dualistic, right/wrong, black/white, way of thinking about the world to a more

committed and empathetic way. Details about the Perry model and the way it was assessed in this study will be discussed later.

The purpose of this study was to examine the relationship between the development of identity and the development of cognition in college freshmen. The main research question the study attempted to answer was: what is the relationship between identity and cognitive development in traditional college freshmen? Could it be that freshmen with higher levels of cognitive development have a higher level of identity and freshmen with lower levels of cognitive development have lower levels of identity? Could it be that there is an inverse relationship between identity and cognitive development: that is do freshmen with higher levels of cognitive development have lower levels of identity and freshmen with lower levels of cognitive development have higher levels of identity? Or, is it that no relationship exists at all between cognitive development and identity in college freshmen.

Based on Berzonsky's (1985) finding that freshmen lower in identity tended to be academic overachievers, it was hypothesized that a negative relationship exists between cognitive development and identity in this sample of first semester college freshmen. That is, it was hypothesized that freshmen with higher levels of cognitive development are questioning themselves and their identity to a greater extent than freshmen with lower levels of cognitive development.

Method

Participants

The sample was comprised of 467 college freshmen attending a comprehensive, medium size, public institution on the mid-Atlantic coast. Ages ranged from 17-23 years, with a mean age of 18.12. Fifty-one percent of the subjects were male; 49% were female. The sample was predominantly White (88.3%),. 8.1% were Black, 1.3% were Asian, .2% were American Indian, .2% were Hispanic, and 1.9% were from other ethnic groups.

Instruments

Identity. The Erwin Identity Scale (Erwin and Delworth, 1980) was used to assess students' level of identity. The Erwin Identity Scale (EIS) measures three dimensions of the student's self-image. These three dimensions include: a) confidence, b) sexual identity, and c) conceptions about body and

appearance. Each has Cronbach's (1951) alpha reliability estimates of .90, .74, and .81 respectively (Erwin and Schmidt, 1982). The instrument is also reported to have good construct and predictive validity (Erwin, 1988).

Confidence assesses a student's ability to have appropriate faith in his or her own capabilities, while subsequently recognizing and accepting the need for outside support from others. The sexual identity component measures the extent to which a student has clarified and accepted his or her sexual feelings. Sexual identity does not assess students' degree of sexual activity or lack of sexual activity. Conceptions about body and appearance indicate the extent to which a student accepts his or her physical appearance and exhibits a personal dress style influenced by his or her own tastes and values.

The EIS is comprised of 59 statements describing how people feel about themselves and other people. For each statement the student is asked to respond to how true the statement is of him- or herself on a five point scale. A higher EIS score represents a higher level of identity. A lower EIS score represents a lower level of identity.

Cognitive Development. The Scale of Intellectual Development (Erwin, 1982) was used to assess students' cognitive development. The Scale of Intellectual Development (SID) is an objectively scored instrument based on Perry's (e.g., 1968, 1970) scheme of intellectual development for college undergraduates. The SID measures four dimensions of cognitive development: dualism, relativism, commitment, and empathy, with Cronbach's (1951) alpha coefficients of .81, .90, .76, and .73 respectively (Erwin and Schmidt, 1982). Construct validity evidence for the instrument may be found in several studies (e.g., Erwin, 1986; Erwin and Marcus-Mendoza, 1988).

Students who score high on the dualism component tend to see issues in a clear-cut, a right-wrong, or a black-white manner. Dualistic students tend to look to authority figures such as parents and teachers for immediate answers to their problems. Dualistic students rely very little on themselves when solving problems or making decisions and do not believe that they have the ability to work out solutions to problems on their own. Students who are relativistic realize that they may have the ability to work out solutions to problems. However, relativistic students do not trust their abilities and still rely on external sources for solutions to their problems. In other words, relativistic students have observed that

alternative perspectives and diversities are realities, but still believe that outside forces determine their future. Students high in commitment have recognized (for the first time) that their way of thinking and ideas are valid and have become committed to their own personal belief system and way of processing information. Committed students, while placing extreme importance on their own views, also recognize and appreciate that others have alternative perspectives from their own. Students who have reached the highest level of intellectual development, empathy, as measured by the SID feel responsible to society for their actions and behaviors.

The SID is comprised of 115 items. For each item the student is asked to respond to whether he or she agrees with that statement on a four point scale. A higher total (the total of the four subscales) SID score represents a higher level of cognitive development. A lower total SID score represents a lower level of cognitive development.

Students completed both the EIS and the SID during a mandatory freshmen assessment session. Approximately 2000 freshmen participated in the assessment. All students did not take identical assessment measures. Instead, students were randomly assigned to one of several testing groups. At the beginning of the testing sessions proctors read the instructions to the students, asked them to respond to each item honestly, informed them that one of the instruments (the SID) had an "honesty component" built into it which could detect those subjects who were not being completely honest, and assured them of complete confidentiality in their responses. Students were given as much time as they needed to complete both instruments. All of the students completed both instruments within two hours. Those students who obtained scores greater than 19 on the fake subscore (the honesty component) were deleted from the final sample, as suggested by Erwin (1982). All in all, 35 students were deleted from the sample because of high fake subscores.

Parcels were formulated representing the three dimensions on the EIS and the four dimensions on the SID. Parcels are simply the sum of items representing particular subscales. Due to the nature of the scoring on the instruments, higher parcel scores represented a higher identity component and a higher cognitive component.

Analytical Procedure

Hierarchical structural equation modeling was performed using the LISREL VI program (Joreskog and Sorbom, 1984). Hierarchical structural modeling was used so the relationship between the latent variables and the measured variables could be determined and therefore, the strength of identity and cognitive development (as measured by the EIS and the SID) could be assessed. In addition, hierarchical structural equation modeling allows several competing models to be tested against one another. This procedure allows the determination of an optimal structural model.

Latent variables. Because many constructs in the social and behavioral sciences are not directly measurable (such as identity and cognitive development), latent variables are often measured. Latent variables are hypothetical constructs that can not be observed or directly measured. Instead, a number of observed variables or indicators can be used to measure latent variables. Each indicator has a relationship with the latent variable, but in order to obtain an unbiased measurement, several indicators per latent variable should be considered (Joreskog, 1981). Another reason for assessing latent variables is that most of the measures employed contain sizeable errors of measurements, which if not taken into account, can cause severe bias in the results.

In this study, cognitive development and identity served as latent variables in the models tested. The observed variables were parcels or sums of items on the EIS and the SID representing their respective subscore. There were three observed variables measuring the latent variable identity (confidence, sexual identity and conceptions about body and appearance) and four observed variables measuring the latent variable cognitive development (dualism, relativism, commitment, and empathy). Hence, each structural model was fit to a 7 X 7 matrix, consisting of three indicators for the EIS and four indicators for the SID.

The fit of the models. A series of specified models were evaluated along with a null model. Specified models proposes and tests hypothesized paths. While a null model is basically a model which allows little or any correlation among paths and is used for comparison with the specified models. The fit of the models and the differences in fit of nested models were assessed using two types of criteria. The first criterion was one of statistical significance. Using maximum likelihood estimation of model

parameters, the fit of a structural model may be evaluated using a chi-square test of fit. If the model is associated with a significant chi-square value, there is a statistical basis for reporting in favor of a model with at least one additional parameter estimate.

The chi-square test, however, is sensitive to sample size. The probability of accepting a model by a chi-square test increases as sample size decreases. Thus, one's favorite model will stand the best chance of being accepted when tested against the data of small samples (Bentler and Bonett, 1980). To remedy the sensitivity of chi-square to sample size, Bentler and Bonett (1980) proposed two measures of practical fit of models, rho and delta. Rho, a generalization to restricted covariance structure models of the Tucker and Lewis (1973) reliability coefficient for an unrestricted factor model, is a relative measure of the off-diagonal covariation among variables explained by a model (Cited in Widaman, 1985). Rho is a relative measure because the fit of each model is evaluated with regard to the degrees of freedom for the model. Delta is an absolute measure of fit because delta represents the proportion of off-diagonal covariation explained by a model regardless of the degrees of freedom (cited in Widaman, 1985). Rho and delta should both attain values of at least .90 for a model to be accepted (Bentler and Bonett, 1980).

According to Joreskog (e.g., 1981) and Bentler and Bonett (1980), latent variable models can be tested most powerfully when evaluating a series of nested models that are specified on an a priori basis. One structural model, A, is nested within a second model, B, if Model B contains all parameter estimates in Model A plus one or more additional estimates. The difference in fit of two nested models can be evaluated using both types of fit criteria. For the statistical criterion, the difference in chi-square values for two nested models is distributed as a chi-square with degrees of freedom equal to the difference in degrees of freedom for the two models. For the practical fit criterion, differences in ρ and Δ greater than .01 may be considered practically significant as suggested by Widaman (1985). According to Widaman (1985) a model that practically differs from another model at .01 or greater is a better representation of the data and should therefore be the preferred model. Differences between models in either rho or delta less than .01 are unimportant on practical grounds.

In addition to evaluating the relative fit of a structural model, each parameter estimate in a model can be evaluated for significance. Using maximum likelihood estimates, an approximate standard error is provided for each parameter estimate. The ratio of a parameter estimate over its standard error is distributed approximately as an z-variate, and parameter estimates with z-ratios over 2.0 in absolute magnitude are considered statistically significant at the .05 level.

Results

Overview

The form of the hypothesized relations between cognitive development and identity is shown in Figure 1. Circles are used to represent latent variables, and squares are used to signify their indicators. As shown in Figure 1, confidence, sexual identity, and conceptions about body and appearance served as indicators for the latent variable identity; dualism, relativism, commitment, and empathy served as indicators for the latent variable cognitive development. The single headed arrows extending from the circles to the rectangles in Figure 1 estimate the strength of each measurement component's relationship to, or measurement of, the latent variable. In Figure 1, the LISREL estimate (which indicates the strength of the relationship between the latent variable and the measured variables) is indicated by the top number on each arrow. The probability of each LISREL estimate is indicated by stars to the right of the estimate. Standard errors are indicated below each estimate in parentheses.

Each indicator has a certain amount of error variance related to that particular variable. In factor analysis, this is referred to as specific variance. The error variance for each indicator is indicated by double headed curved arrows. However, because each latent variable was considered to be representative of one specific construct (identity and cognitive development), these variables were fixed to 1.0. In other words, residuals were not allowed to correlate for the latent variables. Error variance for these two latent variables was not considered to be theoretically or empirically valid. The LISREL estimate for each indicator is indicated next to the curved arrows as are the associated standard errors and significance levels.

In sum, Model 1 estimates the factor models for the latent variables identity and cognitive development. It is important to estimate the models specific components as well as the overall fit of the

model. If the factor model does not indicate significant relations between the measurement components and the latent components, then the latent variables in question (in this case identity and cognitive development) can not legitimately be considered representative of the construct they purport to represent.

Insert Figure 1 about here

The correlations, covariances, means and standard deviations for the EIS and the SID are presented in Table 1.

Insert Table 1 about here

Statistical and practical indices of fit are presented in Table 2; indices of difference between nested models are presented in Table 3.

Insert Tables 2 and 3 about here

As shown in Figure 1, all measurement LISREL maximum likelihood estimates were highly significant for both identity and cognitive development. All observed variable residuals were also significant, except for commitment.

Model 1 is a significant improvement ($p < .005$) compared to the null model. In addition, using the suggestion by Widaman (1985) of rho and delta values greater or equal to .01 indicating model improvement, practical indices also suggest that the factor model (Model 1) is an improvement compared to the null model. Although Model 1 was an improvement over the null model (Table 3), it was rejected on both statistical (due to the high χ^2) and practical grounds (both ρ and Δ attained values below .90).

In order to improve the fit, an additional path estimating the relationship between the two latent variables (path ψ (2,1)) was freed yielding Model 2. This path is indicated in Figure 2 by the double headed arrow extending from cognitive development to identity. This path estimates the magnitude and direction that exists between the two latent variables. Model 2 (Figure 2) revealed highly significant measurement components and observed residuals. Importantly, the path from intellectual development to identity was also highly significant and negative. Although Model 2 was a statistical improvement compared to Model 1 (See Table 3), Model 2 was rejected as the practical indices were discrepant with only ρ attaining a value above .90.

Insert Figure 2 about here

The next model tested was Model 3, Figure 3. Model 3 was identical to Model 2 except that it added the observed correlated residual COMMITMENT-EMPATHY. Measured variables of a particular latent variable often share error variance with other measured variables. It holds then that these relationships should be considered and estimated in a latent variable model. These relationships are referred to as observed correlated residuals. Observed, because one is referring to the measurement components. Correlated, because one is estimating the residual variance between two observed variables. The correlated residual in Model 3 (COMMITMENT-EMPATHY) revealed a significant LISREL estimate.

Model 3 revealed significant measurement components and observed correlated residuals. Again, as in Model 2, the path INTELLECTUAL DEVELOPMENT-IDENTITY was significant and negative.

Insert Figure 3 about here

As illustrated in Table 2, Model 3 was acceptable both in terms of ρ and Δ, and (see Table 3) Model 3 was a statistical improvement over Model 2.

Model 4, which was identical to Model 3, but with the addition of the correlated residual DUALISM-RELATIVISM, is illustrated in Figure 4.

Insert Figure 4 about here

As shown in Figure 4, all measurement LISREL estimates and observed correlated residuals were significant for Model 4. The path INTELLECTUAL DEVELOPMENT-IDENTITY was also significant and negative. Table 2 indicates that Model 4 is practically acceptable as both ρ and Δ attain values greater than .90. Model 4, (see Table 3) was also a significant improvement compared to Model 3. Hence, because Model 4 achieved the highest practical ρ and Δ values and came the closest to reaching an acceptable overall statistical fit, it was deemed the optimal structural model. It should be noted that one other model was tested which included an additional observed correlated residual. This model, however, was not an improvement compared to Model 4.

Discussion

The results of this investigation suggest that identity and cognitive development are related, and that this relationship is a negative one. In this sample, the higher a students level of cognitive development, the lower his or her development of identity. Conversely, in this sample, the lower a student's level of cognitive development the higher his or her development of identity.

In addition, the results suggested that identity and cognitive development could be viewed as valid constructs based on the LISREL analysis. The LISREL analysis revealed strong relationships between the observed variables and the latent variables for both constructs under examination.

The optimal structural model, Model 4, also revealed significant error variance LISREL estimates for each

observed variable. In addition, Model 4 revealed significant correlated residuals between dualism and relativism and between commitment and empathy for intellectual development. This suggests that dualism and relativism and commitment and empathy have specific error variance in common. Theoretically, these relationships are interpretable and are acceptable.

Students in this sample were traditional entering freshmen. For most of these students, it was their first time away from home and new experiences, decisions and responsibilities were awaiting. In some ways, these students were experiencing a crisis of the self. It could be that students with higher levels of cognitive development as measured by the Perry scheme were more aware of their new environment and were questioning themselves to a greater extent about who they were or would be in their new surroundings than were other students. Hence, these students scored lower on the identity scale.

Students scoring lower on the SID, those who tend to think dualistically, were perhaps not as sensitive to the requirements and responsibilities of their new college environment. These students were, perhaps, more myopic as entering freshmen and therefore, were not questioning themselves and their identity as much as brighter students.

It is important to note that results from this study cannot be generalized to an entire four year undergraduate college population. It is anticipated that the sample utilized in this study will be tested with the same two instruments, the EIS and the SID, at two additional points in time: the sophomore year and at the end of the senior year. At these times, it will be possible to see if the results from this study are unique to traditional college freshmen, or if this relationship persists throughout the college years. If this relationship does indeed persist throughout the college years, then intervention programs would be warranted to help this often overlooked group of students develop a better sense of self. Intervention programs could include workshops, conducted by counseling departments, that focusing on the development of identity or self concept.

REFERENCES

Bentler, P. M., & Bonett, D. G. (1980). Psychological Bulletin, 88, 588-606.

Berzonsky, M. D. (1985). Diffusion within Marcia's identity - states paradigm: Does it foreshadow academic problems? Journal of Youth and Adolescence, 14, 527-538.

Chang, C. (1982). Ego identity status in Chinese university students: A test of the validity of Marcia's categorization for ego identity. Bulletin of Educational Psychology, 15, 31-46.

Chickering, A. W. (1969). Education and identity. San Francisco: Jossey-Bass.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests, Psychometrika, 16, 297-334.

Erikson, E. H. (1959). Identity and the life cycle. (Monograph). Psychological Issues, 1. Erikson, E. H. (1963). Childhood and society. New York: Norton.

Erikson, E. H. (1968). Identity: Youth and crises. New York: Norton.

Erwin, T. D. (1983). The Scale of Intellectual Development using Perry's scheme. Journal of College Student Personnel, 24, 6-12.

Erwin, T. D. (1986). Students' contribution to their college costs and intellectual development. Research in Higher Education, 25 (2), 194-203.

Erwin, T. D. (1988). Scoring manual for the Erwin Identity Scale. Unpublished manuscript, Office of Student Assessment, James Madison University, Harrisonburg, Virginia.

Erwin, T. D. & Marcus-Mendoza, S. (1988). Motivation and student's participation in leadership and group activities. Journal of College Student Development, 29, 356-361.

Erwin, T. D. & Schmidt, M. R. (1982). The convergent validity of the Erwin Identity Scale. Educational and Psychological Measurement, 41, 1307-1310.

Erwin, T. D. & Delworth, U. (1980). An instrument to measure Chickering's vector of identity. National Association of Personnel Administrator's Journal, 17, 19-24.

Hayes, J. M. (1977). Ego identity and moral character development in male college students. Unpublished doctoral dissertation, The Catholic University of America.

Hogan, R. (1973). Moral conduct and moral character: A psychological perspective. Psychological Bulletin, 73, 217-232.

Joreskog, K. G. (1981). Statistical models for longitudinal studies. In F. Schusinger, S. Medmich and J. Knop (Eds.), Longitudinal research: Methods and uses in behavior science (pp.118-124), Boston: Martines Nighoff Publishing.

Joreskog, K. G. & Sorbom, D. (1984). LISREL VI: Analysis of linear structural relationships by maximum likelihood and least squares methods. Chicago: National Education Resources.

Marcia, J. D. (1966) Development and validation of ego identity status. Journal of Personality and Social Psychology, 3, 551-558.

Marcia, J. E. (1980). Identity in adolescence. In J. Adelson (Ed.), Handbook of adolescent psychology (pp. 159-187). New York: John Wiley and Sons.

Perry, W. G. (1968). Patterns of development in thought and values of students in a liberal arts college: a validation of a scheme. (Final report, project number 5-0825, contract number SAE-8973). Cambridge Mass: Bureau of Study Counsel, Harvard University.

Perry, W. G. (1970). Forms of intellectual and ethical development in the college years. New York: Holt, Rinehart and Winston, Inc.

Podd, M. H. (1972). Ego identity status and morality: The relationship between two developmental constructs. Developmental Psychology, 6, 497-507.

Poppen, P. F. (1974). The development of sex differences in moral judgement for college males and females. Unpublished doctoral dissertation, Cornell University, Ithica, NY.

Stark, P. A. & Traxler, A. J. (1974). Empirical validation of Erikson's theory of identity crises in late adolescence. Journal of Psychology, 86, 25-33.

Tucker, L. R. & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. Psychometrika, 38, 1-10.

Widaman, K. F. (1985). Hierarchically nested covariance structure models for multitrait-multimethod data. Applied Psychological Measurement, 9, 1-26.

Table 1

Correlations and Covariances for the Erwin Identity Scale and the Scale of Cognitive Development.

Indicators	Confidence	Sexual Identity	CABA[a]	Dualism	Relativism	Commitment	Empathy
Confidence	201.34	.659	.570	-.321	-.475	-.319	-.032
Sexual Identity	91.97	97.76	.508	-.291	-.414	-.274	-.134
CABA[a]	73.65	45.47	83.41	-.226	-.301	-.172	-.126
Dualism	-66.71	-31.92	-30.19	214.49	.312	.365	.008
Relativism	-72.29	-41.87	-28.22	46.24	104.97	.449	.116
Committment	-42.65	-25.84	-14.72	50.03	43.76	88.75	.332
Empathy	- 4.32	-12.27	-10.98	.985	10.83	28.94	89.98

*Note: Correlations appear on the upper diagonal, covariances on the low diagonal.

[a] Full name is Conceptions About Body and Appearance.

Table 2

Goodness of Fit Indices For Structural Models Representing the Relationship Between Cognitive Development and Identity.

Model	χ^2	df	Prob.	rho	delta
0. Null Model	898.25	18	<.0001	-	-
1. Factor loadings added.	199.65	14	<.0001	.714	.77
2. Model 1, but with $\Psi_{2,1}$ added.	83.40	13	<.0001	.871	.907
3. Model 2, but with 1 additional correlated residual.	43.83	12	<.0001	.927	.951
4. Model 3, but with 1 additional correlated residual.	28.64	11	.003	.967	.968

Table 3

Difference of Fit for ModelsTested

Model Comparisons	Components Tested	Difference In χ^2	df	Prob.	rho	delta
0 vs. 1	Factor Loadings.	698.6	4	<.005	.714	.77
1 vs. 2	Model 1, but with $\psi_{2,1}$ added.	116.25	1	<.005	-.157	-.137
2 vs. 3	Model 2, but with 1 additional correlated residual.	39.57	1	<.005	-.056	-.044
3 vs. 4	Model 3, but with 1 additional correlated residual.	15.19	1	<.005	-.04	-.017

Figure Captions

Figure 1. The relationship between cognitive development and identity. Model 1: Factor loadings estimated.

Figure 2. The relationship between cognitive development and identity. Model 2: Model 1, but with β_1 added.

Figure 3. The relationship between cognitive development and identity. Model 3: Model 2, but with one additional correlated residual added.

Figure 4. The relationship between cognitive development and identity: Model 3, but with one additional correlated residual.

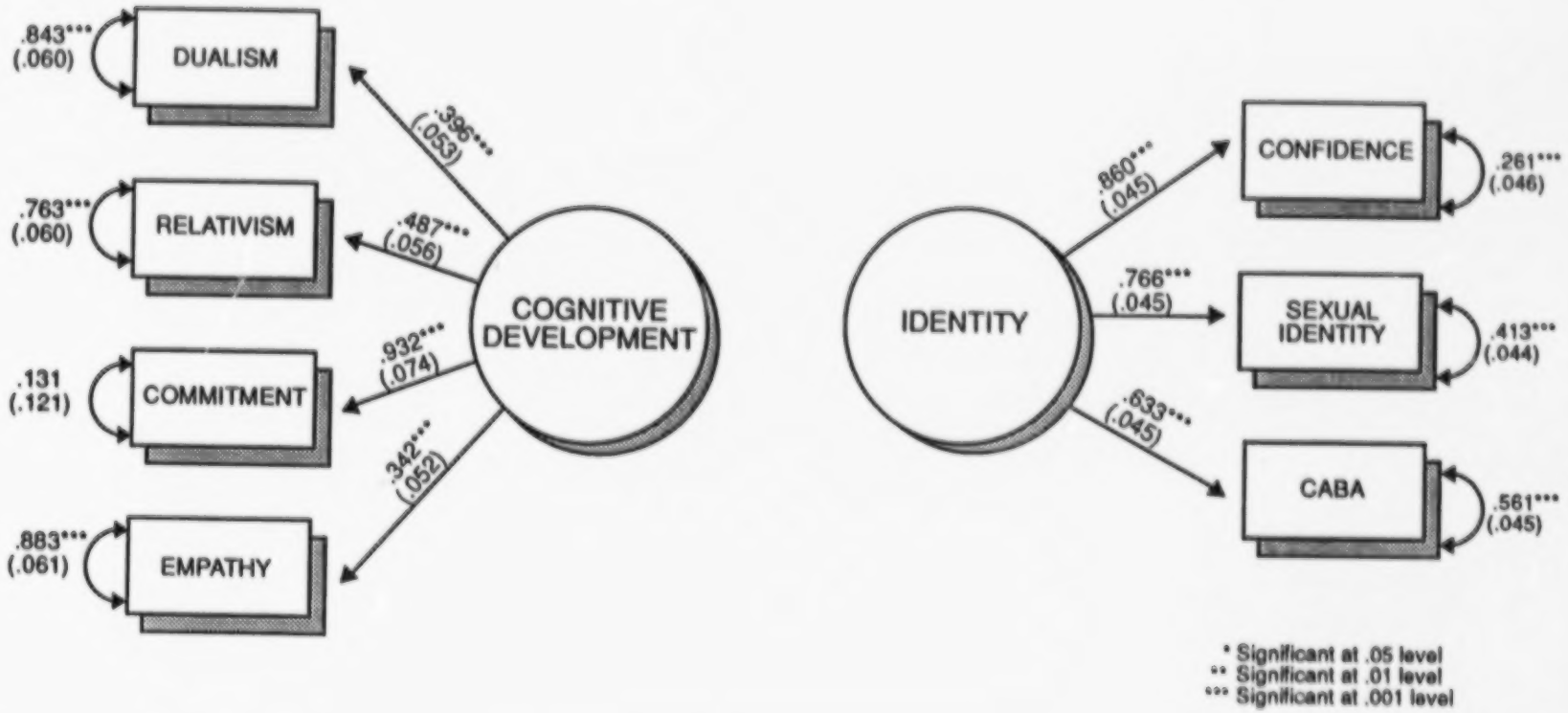

Figure 1. The relationship between cognitive development and identity.
Model 1: Factor loadings estimated.

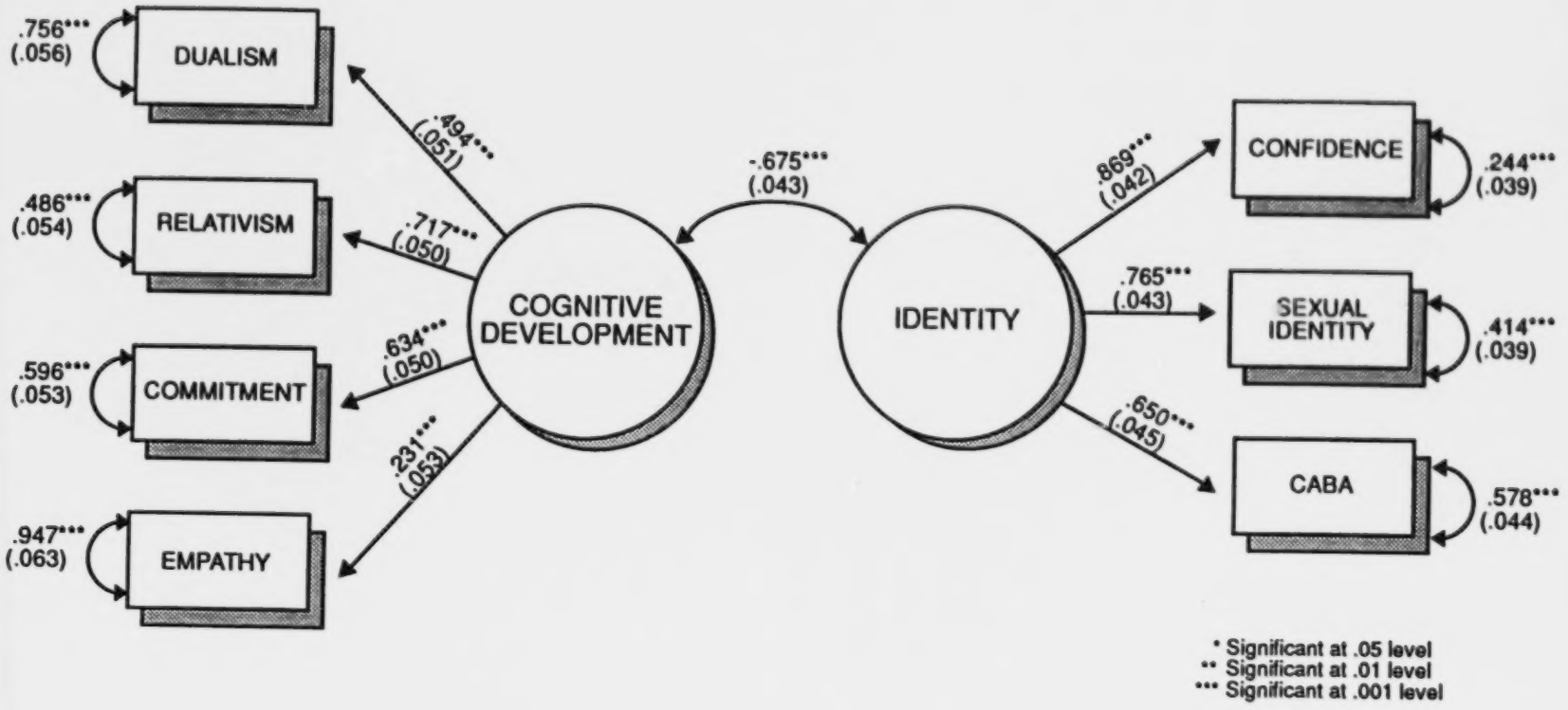

Figure 2. The relationship between cognitive development and identity. Model 2: Model 1, but with $\Psi_{2,1}$ added.

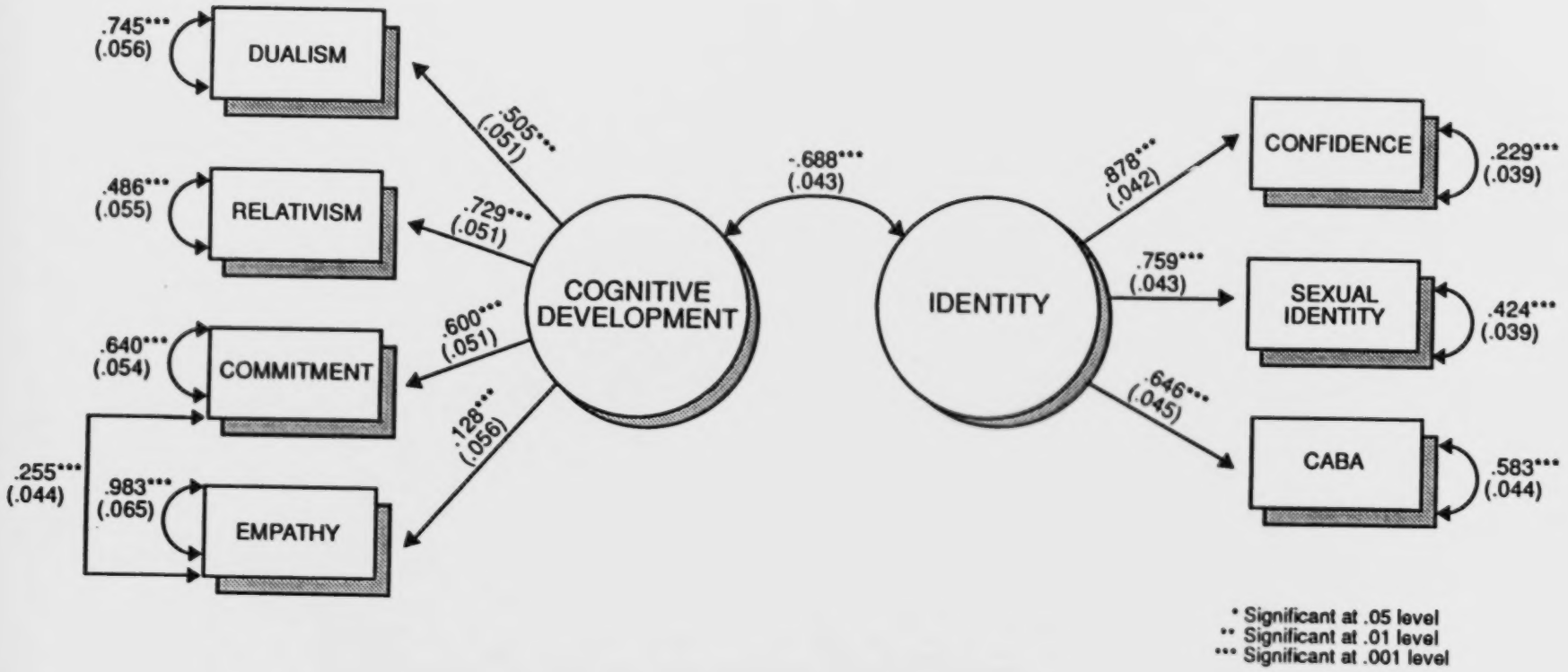

Figure 3. The relationship between cognitive development and identity. Model 3: Model 2, but with 1 additional correlated residual added.

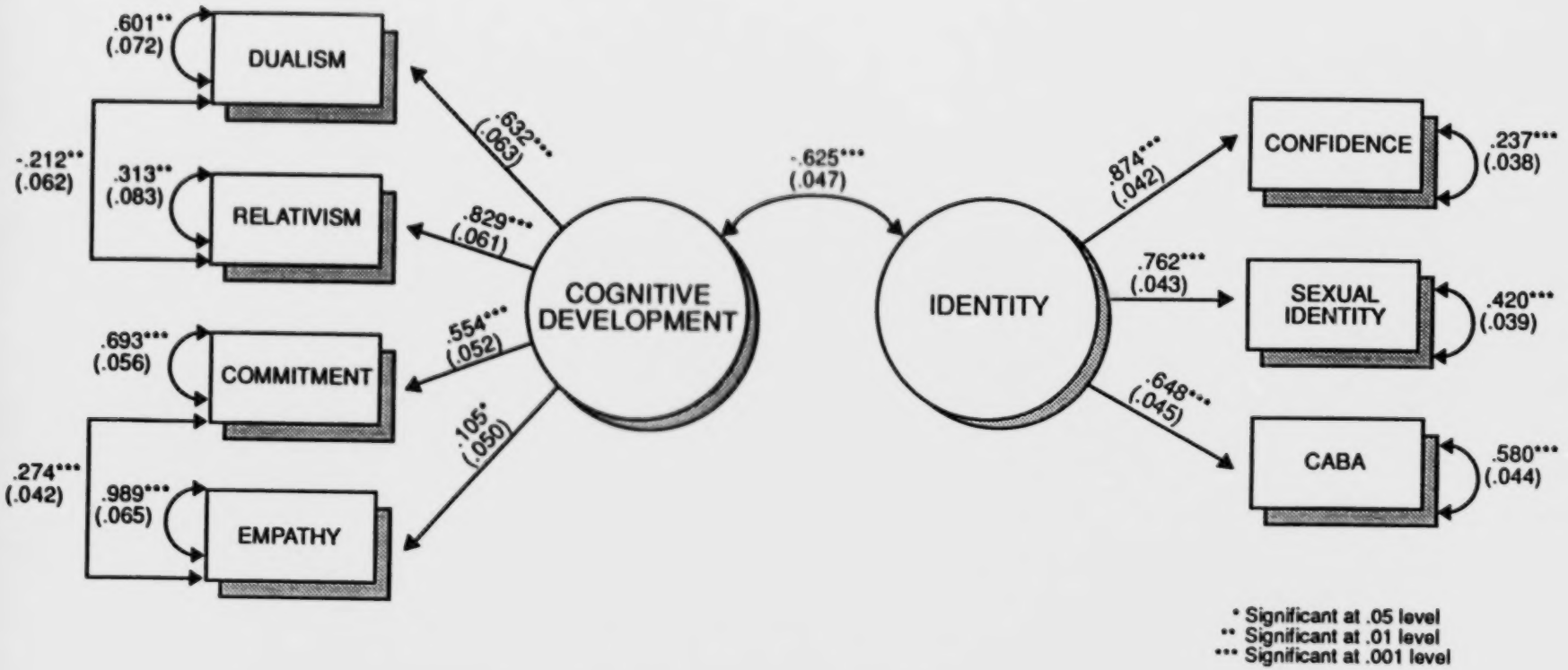

Figure 4. The relationship between cognitive development and identity. Model 4: Model 3, but with 1 additional correlated residual.